Fig. 1

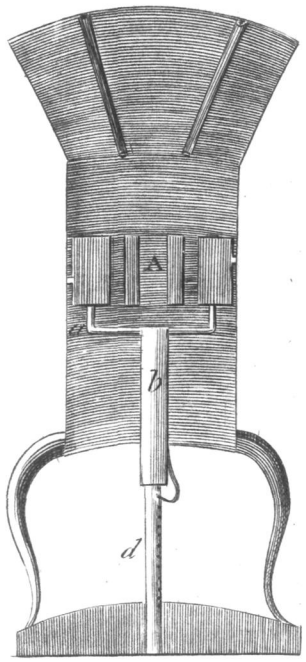


Fig. 3

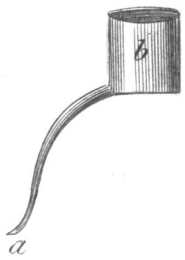
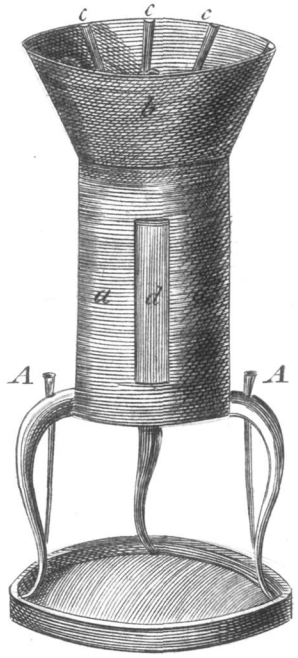


Fig. 2



Account of a CHAMBER LAMP FURNACE. *By* ROBERT PERCEVAL, *M. D. and M. R. I. A.*

THE chamber lamp furnace, of which a figure is annexed, I have found convenient in many chemical experiments. It conſiſts of a cylindrical body, $4\frac{1}{8}$ inches diameter and $9\frac{1}{2}$ high, (*a*, Fig. 2.) ſurmounted by a laboratory (or ſpace for containing veſſels) which is a hollow truncated cone, $6\frac{1}{2}$ inches wide at top and $4\frac{1}{8}$ at bottom (*b*, Fig 2.). Its conical ſhape adapts it to veſſels of different ſizes. To the inſide of the laboratory are riveted ſix tubes $\frac{3}{8}$ths of an inch diameter, (*c*, *c*, Fig. 2.) on which the veſſel reſts, ſo that ſpace ſufficient for the paſſage of heated air is interpoſed between it and the inſide of the laboratory. To three of thoſe tubes the iron ſpikes marked A in figure the ſecond, are fitted, which may be introduced into them occaſionally. The converging extremities of theſe form a ſupport for veſſels, the bottoms of which are leſs than $4\frac{1}{8}$ inches in diameter. In one of theſe tubes, whilſt the lamp is burning, is placed the ſmall

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pipe *a*, Fig. 3, which communicating with the reſervoir *b*, ſupplies oil gradually to the lamp, through an aperture contrived for that purpoſe. The lamp, which is contained in the body of the furnace, is made according to Argand's conſtruction, with an oil ciſtern, which is an hollow cylinder. The diameter of the wick-holder, in the clear, is one inch and $\frac{5}{8}$ths; the diameter of the circular air aperture within (A, Fig. 1.) is one inch and $\frac{2}{8}$ths. The lamp is ſupported by two croſs ſtays, (*a*, Fig. 1.) which are fixed to the top of the tube *b*, Fig. 1. This tube riſes and falls on the ſtem *d*, and is fixed at different heights by means of the ſpring catch *c*, Fig. 1, which paſſing through the holes *b b*, paſſes into correſponding holes of the ſtem. The tube, in riſing and falling, carries with it the lamp, which, by this means, may be ſupported at different diſtances from the veſſels in the laboratory. The furnace itſelf anſwers the purpoſe of a chimney to the lamp. In the body of the furnace is an opening (*d*, Fig. 2.) for trimming the lamp; this may be cloſed by a ſlide. When this is cloſed, the heat of the lamp is conſiderably increaſed, for reaſons too obvious to be inſiſted upon. The bottom of the lamp, to make it more ſteady, is loaded with lead.

I WAS employed in making ſome experiments with this lamp, aſſiſted by my ingenious friend Mr. Healy, when he ſuggeſted that the heat produced by it would probably be greater if the internal air aperture of the wick-holder were diminiſhed. This conjecture I thought probable, as, in the ſtate of the lamp which I have deſcribed, the central air was ſo far removed from the flame as not to be heated conſiderably by it, and this, we imagined, might counterbalance any advantage which might reſult from the more liberal

liberal ſupply of air to the flame. To determine whether this was really the caſe, we cauſed a ſtopper to be made half an inch in diameter, which, fitting into the central aperture with a ſpring, left a circular opening $\frac{3}{8}$ths of an inch wide for the paſſage of air.

We then obſerved with a thermometer and ſtop-watch at what rate mercury contained in a glaſs ſolution bottle, which was placed in the laboratory, acquired temperature, firſt, when the ſtopper was not employed, and, afterwards, when it was. The bottom of the veſſel was one inch and $\frac{7}{8}$ths diſtant from the edge of the wick-holder.

The reſult of theſe obſervations is contained in the following table. At the beginning of obſervation the thermometer placed in the mercury ſtood at 113,5.

Without ſtopper.

Minutes of obſervation.	Temperatures.	Increments of Temperature in a minute.
1	143,5	30
2	174	30,5
3	203	29
4	231	28
5	256	25—142,5 in 5°

The

The ſtopper was now put in.

6	292	-	36 *
7	355	-	63
8	409,5	-	54,5
9	458	-	48,5
10	500	-	42
			244 in 5'

It is obvious that the effect of the ſtopper in increaſing the heat muſt have been conſiderable, as, from the former part of the obſervation, it appears, that as the temperature of mercury encreaſes, the increments of its temperature in a given time (circumſtances remaining the ſame) diminiſh. Yet the ſum of the increments in the laſt five minutes conſiderably exceeds the ſum of the increments in the firſt. We now wiſhed to try the effect of diminiſhing ſtill farther the internal air aperture of the wick-holder, and for this purpoſe adapted to the ſtopper a ring, which encreaſed its diameter to $\frac{7}{8}$ths of an inch, and conſequently diminiſhed the width of the circular opening for air to $\frac{3}{16}$ths of an inch.

The following table will ſhew the effect of this alteration. In this experiment the lamp burned leſs briſkly than in the former. The

* The increment of temperature in the 6th minute was diminiſhed by lowering the ſlide for the admiſſion of the ſtopper.

The temperature of the mercury at the beginning of obſervation was 113,5.

Without ſtopper.

Minutes of obſervation.	Temperatures.	Increments of Temperature in a minute.
1	135	21,5
2	157,5	22,5
3	177	19,5
4	196	19
5	213	17—99,5 in 5°.
	The enlarged ſtopper was now put in.	
6	247	34
7	329	82
8	402,5	73,5
9	468	65,5
10	524	56—311 in 5°.

As the proportion of 311 to 99,5 is much greater than of 244 to 142,5, the enlarged ſtopper appeared to have conſiderable advantage in encreaſing the heat.

The comparative effect of the two ſtoppers was determined by another trial, as is expreſſed in the following tables.

Lamp with enlarged ſtopper.
Temperature of mercury 125.

Minutes of obſervation.	Temperatures.	Increments of Temperature in a minute.
1	175	50
2	228	53
3	274	46
		149 in 3°.

Lamp

Lamp with ſmall ſtopper.

Temperature of mercury 125.

Minutes of obſervation.	Temperatures.	Increments of Temperature in a minute.
1	170	45
2	214	44
3	254	40
		129 in 3°.

Thus it appears, that, in lamps made on this conſtruction, the internal aperture for air may be conſiderably diminiſhed with advantage. What is the moſt advantageous opening I have not had leiſure to determine. It is probable it would not bear to be diminiſhed much more than in the experiment laſt recited.